

CEREBROVASCULAR DISEASE IN BLACKS

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Stroke in black Americans is an important health problem that has been understudied. A brief review of the pertinent literature and strategies for evaluating and managing patients with cerebrovascular disease are presented.

Stroke is an important health problem for black Americans. The third leading cause of death in the United States, stroke is an even more important cause of long-term morbidity and disability. Blacks have a higher prevalence and severity of hypertension^{1,2} and a higher incidence of strokes when compared with whites. While ischemic heart disease is a major killer in white populations, exceeding stroke, the stroke-myocardial infarction ratio is higher in blacks. There is now also compelling evidence showing important racial and sex differences in the distribution of vascular lesions and in the types of strokes.³⁻¹¹ The differences should be considered when evaluating and treating patients with transient ischemic attacks and stroke. After briefly citing the data, the relevance of these findings to the physician's management of blacks with cerebrovascular disease will be discussed.

THE RACIAL AND SEX DIFFERENCES

Whites have more severe disease of the extracranial arteries, predominantly originating in the

internal carotid and vertebral arteries of the neck. Extracranial vascular lesions are more common in men (approximately 2:1 ratio) and are highly correlated with coronary and peripheral vascular disease, elevated systolic pressure,¹² and hypercholesterolemia. The incidence of extracranial occlusive vascular disease is quite low in blacks, but when present, it is associated with coronary and peripheral vascular disease and abnormal serum lipids.

Blacks have more severe disease of the large intracranial arteries, especially the middle, anterior, and posterior cerebral arteries and their major branches, and the vertebral and basilar artery branches. Intracranial occlusive disease has less male preponderance than extracranial disease and does not correlate with coronary or peripheral vascular disease or hyperlipidemia.^{3-5,12} Intracranial vascular disease is more common in diabetics, a disorder with a higher prevalence in blacks. The incidence of transient ischemic attacks (TIAs) is less in patients with intracranial occlusive disease, and TIAs are less common in blacks.

Hypertension damages the small intracerebral penetrating arteries, mainly affecting the lentostriate branches of the middle cerebral arteries, the thalamoperforating and thalamogeniculate branches of the posterior cerebral arteries, and the basilar penetrating arteries to the brain stem.^{13,14} Penetrating artery disease causes lacunar infarcts in the basal ganglia, internal capsule, thalamus and pons, and can lead to white matter changes and dementia.¹⁵ There is a slightly higher incidence of lacunar infarcts in blacks; the slight difference is explained by the higher prevalence of hypertension.

Intracerebral hemorrhage is more common in black men than in black women or in white men or women. This is explained by the greater severity of uncontrolled hypertension in this group com-

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pared with black women and with white men and women.

The distribution and patterns of vascular disease in blacks is very similar to that found in Japanese and Chinese patients.^{16,17}

EVALUATING AND TREATING BLACKS WITH SUSPECTED CEREBROVASCULAR DISEASE

Use of Diagnostic Tests

Noninvasive tests for the evaluation of the extracranial arteries, especially the internal carotid arteries, have become commonplace.¹⁸ These noninvasive tests are of two general types. The first group gives direct information about carotid artery lesions, such as real-time echo (B-mode scanning), continuous wave Doppler imaging, and quantitative direct bruit analysis (phonoangiography). Computed tomography (CT) and magnetic resonance imaging (MRI) of the neck also can provide images of the internal carotid arteries and undoubtedly will be used more often in the future.^{19,20} The second group gives indirect information about flow in the carotid arteries by quantifying the amount, pressure, and direction of flow in carotid artery branches to the eye, brain, and forehead. Indirect tests include: oculoplethysmography (either the Kartchner or Gee types), ophthalmodynamometry, radionuclide angiography, thermography, and directional Doppler ultrasound of the periorbital arteries. These tests are available to outpatients and give reliable information about the presence of severe narrowing of the extracranial carotid arteries. Digital subtraction angiography (DSA), using either an intravenous or intraarterial injection, also yields reliable images of the extracranial arteries, but venous DSA is not as accurate in the detection of intracranial occlusive lesions. Digital angiography is now also available on an outpatient basis in many medical centers.

Because of the very high incidence of extracranial carotid artery lesions in whites, many physicians now evaluate white patients with TIAs or stroke in the carotid territory using only noninvasive tests. If no major stenosis is found, aspirin is prescribed for prophylaxis. If major stenosis is found, digital or standard angiography is advised. Noninvasive testing is most helpful in men, and in

whites and blacks who have a history or other evidence of peripheral vascular occlusive disease or abnormal serum lipids. In women, and in blacks without these associated conditions, the incidence of important carotid artery stenosis is very low, and noninvasive testing is much less helpful. Negative noninvasive test results have little meaning in a young black patient with stroke.

When angiography is planned in black patients, the capability of visualizing intracerebral and intracranial arteries is critical. Venous DSA is not as useful as arterial DSA or standard angiography by femoral artery catheterization for imaging the intracranial arteries. Because of the higher incidence of intracranial disease, angiography may be more often indicated in blacks.

Computed tomography is the most important test for differentiating intracerebral hemorrhage (ICH) from cerebral infarction. The high incidence of hemorrhage in blacks makes CT particularly important in black patients with strokes, especially in patients with paralysis or stroke progression over minutes or hours. We now know that some patients with ICH have little or no headache, remain alert, and have clear cerebrospinal fluid.^{21,22} Small ICHs are quite difficult clinically to separate from infarcts, a distinction that is critical because of the completely different treatments for these two conditions. Computed tomography is also helpful in differentiating lacunas from large, deep infarcts caused by occlusion of large intracranial arteries⁴; the pattern of infarction on CT is helpful in distinguishing occlusive disease of the middle cerebral and extracranial internal carotid arteries.⁴ Optimally, black and white patients with stroke should have CT.

Echocardiography, especially two-dimensional, is helpful in patients with known coronary artery disease to identify possible cardiac sources of embolism, eg, hypokinetic segments, mural thrombi, or ventricular aneurysm. As coronary artery disease is less common in blacks, this indication for echocardiography is perhaps less important. In the authors' experience with a racially mixed population of stroke patients at Michael Reese Hospital, echocardiography frequently uncovered an unsuspected noncoronary cardiac disease as potential source of cerebral embolism.²³ Sarcoidosis, cardiomyopathies, and mitral annulus calcification were detected by echocardiography, while bacterial and marantic endocarditis and paradoxical

embolism were often missed. In black patients with a single TIA or sudden onset stroke, echocardiography and Holter monitoring can detect previously unknown cardiac disease that could explain stroke. Echocardiography and monitoring are ordered except when there are multiple TIAs in the same vascular territory, or there is a known occlusive extracranial or intracranial arterial lesion appropriate to explain the stroke and no clinical hint of cardiac disease.

Coagulopathies and red blood cell disorders are important causes of stroke, especially in the young and in patients with known systemic illness. Screening for sickle cell disease and testing of coagulation values are important, particularly if the patient is young, normotensive, and has no risk factors for occlusive cerebrovascular disease.

Management

Studies of patients with asymptomatic carotid artery disease document a low incidence of stroke without prior-warning TIAs. This has led to the suggestion not to treat or aggressively evaluate asymptomatic patients but, instead, to wait for symptoms, that is, a TIA. The lower incidence of TIAs in blacks would make this strategy less likely to succeed.

Aspirin has been widely recommended for stroke prophylaxis for patients with asymptomatic carotid artery disease, TIA, or small strokes. The studies that showed some effectiveness for aspirin were performed predominantly in white patients.^{24,25} Extracranial carotid artery lesions are known to ulcerate. Stroke and TIA are caused by embolization of fibrin-platelet clumps that adhere to crevices and irregular surfaces of atheromatous plaques. Aspirin, by decreasing platelet aggregation and adhesion, can theoretically prevent intraarterial fibrin-platelet emboli. Intracranial arterial stenosis, the predominant lesion in women and blacks, affects the arterial media and is characterized by proliferation of muscular and fibrous tissues. Ulceration is not frequent in intracranial lesions. The low incidence of extracranial disease makes it likely (but untested) that aspirin will be less effective for stroke prophylaxis in blacks.

Standard anticoagulants (heparin and warfarin) probably act by preventing the formation, propagation, and embolization of red clots that tend to form in areas of reduced blood flow. The

authors' experience with middle cerebral artery⁴ and bilateral intracranial vertebral artery occlusive disease²⁶ in blacks has suggested that low flow and hypoperfusion are the critical factors in patients with these lesions and that clot embolization is relatively less important. Patients with these arterial lesions, common in blacks, have continued to worsen neurologically despite anticoagulants. Nonetheless, heparin is recommended as short-term (2 to 3 weeks) treatment for patients who have angiographically demonstrated occlusions of large intracranial arteries and warfarin, for long-term use in patients with tight stenosis of the intracranial arteries.²⁷ Hypertension must be carefully controlled when these anticoagulants are used. If the patient continues to worsen while on anticoagulants, strategies to augment blood flow to the region of ischemia should be pursued.

Hypertension is more severe and more common in black patients than in whites.^{1,2} Hypertension-related diseases of small intracerebral penetrating arteries, lacunar strokes, intracerebral hemorrhage, and multi-infarct dementia are also more common in blacks. While intracranial large artery disease is probably not directly caused by hypertension, it is more common in populations (blacks, Japanese, Chinese) with susceptibility to hypertension. These facts dictate the critical importance of control of hypertension in blacks as the major strategy for stroke prevention. Blood pressure control and hypertension detection is especially important in the young and in those with a family history of high blood pressure.

Black hypertensives often have low renin levels,²⁸ a tendency to retain salt and water,^{28,29} relatively high plasma and extracellular fluid volumes, and respond well to diuretic therapy.³⁰ Diabetics and women who are pregnant or on contraceptive pills also have high-fluid volumes and share the tendency for intracranial large artery occlusive lesions. A high-volume state could theoretically contribute to the development of intracranial occlusive lesions.

CONCLUSIONS

The preliminary evidence cited dictates somewhat different strategies in evaluating and treating black and white men and women with cerebral vascular disease. Noninvasive tests are relatively less useful in blacks and women, while angiog-

raphy and CT are even more important diagnostic tools in blacks. Aspirin and standard anticoagulants are probably less useful in blacks, while control of hypertension is even more important. Innovative and intensive strategies for detection and control of hypertension in black communities should be devised and implemented.³¹⁻³³

Unfortunately, the hard data underlying these suggestions are scanty. Clearly, strokes in blacks have been understudied. It is hoped that the next decades will witness an awakening of interest in the nature of stroke in blacks that will provide more information about its prevention, diagnosis, and management.

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